

wherein each focusing lenslet in said first microlens array focuses a reduced-size image of the light emitting source of an LED in said LED array, towards a focal point above said second microlens array;

wherein each collimating lenslet in said second microlens array collimates the light rays associated with the reduced size image of the corresponding light emitting source; and

wherein each cylindrical lenslet diverges the collimated light beam so as to produce a spatially-incoherent planar light illumination beam (PLIB) component, which collectively produce a composite PLIB from the LED-based PLIM.

Claim 264 (currently amended): An LED-based ~~PLIM~~ planar light illumination module (PLIM) chip for use in a ~~PLIM-based~~ planar light illumination and imaging (PLIIM) based system having a relatively short working distance, comprising: a light emitting diode (LED) array (A), a first microlens array (B), a second microlens array (C), and a third microlens array (D), wherein each said array is mounted within an IC package of the PLIM chip, for use in object illumination producing a spatially-incoherent planar light illumination beam (PLIB) therefrom.

Claim 265 (currently amended): An optical process carried out within an LED-based ~~PLIM~~ planar light illumination module (PLIM), wherein (1) a focusing lens element focuses a reduced-size image of a light emitting source of a LED towards a focal point within a barrel structure, (2) a collimating lens element collimates the light rays associated with the reduced-size image of said light emitting source, and (3) a cylindrical lens element diverges the collimated light beam so as to produce a spatially-incoherent planar light illumination beam (PLIB).

Claim 266 (currently amended): An optical process carried out within an LED-based ~~PLIM~~ planar light illumination module (PLIM), wherein (1) each focusing lenslet in a focusing lenslet array focuses a reduced-size image of a light emitting source of an LED towards a focal point above a collimating microlens array, (2) each collimating lenslet in said collimating lenslet array collimates the light rays associated with the reduced-size image of the light emitting source, and (3) each cylindrical lenslet in a cylindrical lenslet array diverges the collimated light beam so as

to produce a spatially-incoherent planar light illumination beam (PLIB) component, which collectively produce a composite spatially-incoherent PLIB from the LED-based PLIM.

Claim 267 (currently amended): A LED-based PLIM planar light illumination module (PLIM) is realized as an array of components, contained within a miniature IC package, namely comprising:

- a light emitting diode (LED) array, on a semiconductor substrate, providing a linear array of light emitting sources having the narrowest size and dimension possible;

- a first microlens array, mounted above and in spatial registration with the LED array, providing a focusing lenslet above and in registration with each light emitting source, and projecting a reduced image of the light emitting source at its focal point above the LED array;

- a second microlens array, mounted above and in spatial registration with the first microlens array, providing each focusing lenslet with a collimating lenslet for collimating the light rays associated with the reduced image of each light emitting device;

- a third microlens array, mounted above and in spatial registration with the second microlens array, providing each collimating lenslet with a linear-diverging type lenslet for producing a spatially-incoherent planar light illumination beam (PLIB) component from each light emitting source; and

- an IC package containing the above-described components in the stacked order described above, and having a light transmission window through which the spatially-incoherent PLIB is transmitted towards a target object being illuminated.

Claim 268 (currently amended): A LED-based PLIM planar light illumination module (PLIM) realized within an IC package design comprising:

- a light emitting diode (LED) providing a light emitting source (having the narrowest size and dimension possible) on a semiconductor substrate;

- a focusing lenslet, mounted above and in spatial registration with the light emitting source, for projecting a reduced image of the light emitting source at its focal point, which is preferably set by the further working distance required by the application at hand;

a cylindrical lenslet, mounted above and in spatial registration with a collimating lenslet, for producing a spatially-incoherent planar light illumination beam (PLIB) from the light emitting source; and

an IC package containing the above-described components in the stacked order described above, and having a light transmission window through which the composite spatially-incoherent PLIB is transmitted towards ~~the~~ a target object being illuminated.